



# CREOL, The College of Optics and Photonics

## Course Syllabus

### OSE2050 Introduction to Photonics Engineering Design, 1 credit

<b>Instructor:</b> Dr. Kyu Young Han	<b>Term:</b> Spring 2024
<b>Email:</b> kyhan@creol.ucf.edu	<b>Class Meeting Days:</b> Tuesday
<b>Phone:</b> 407-823-6922	<b>Class Meeting Time:</b> 6-8pm
<b>Office:</b> A334	<b>Class Location:</b> A210
<b>Office Hours:</b> Tuesday 10am-2pm	<b>Website:</b> UCF Webcourses

**Additional Notes:** I will be in my office at these times, but of course I will be happy to discuss the material with you anytime.

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**Course Catalog Description:** Hands-on experiments on real-life optics & photonics, to develop abilities into design, control, and communication with photonic devices.

**Prerequisites:** No prior knowledge is required. All the majors are welcome.

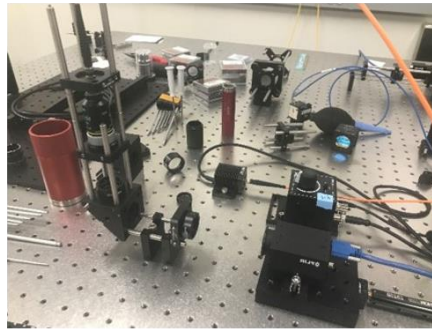
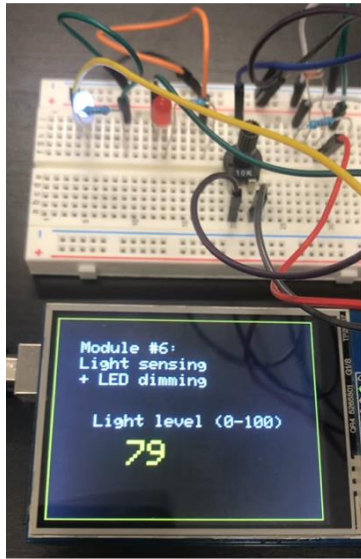
**Detailed Description:** Optics and Photonics is a key enabling discipline in modern industry. Understanding their working principles and applying them to real life are increasingly important. This lab course will introduce how our daily life benefits from photonics techniques by making and designing simple devices. Various topics will be included such as lightning, display, smart home, autonomous mobile and healthcare, etc. This course will use open-source hardware and software. No prior knowledge is required to take the course; however, the very basic knowledge of electronics will be helpful.

#### Learning Outcomes:

After successful completion of this course, students will be able to:

- Design basic photonics devices
- Communicate with devices through computers, smartphones and IoT
- Program scripts to control devices and process commands
- Develop their own projects

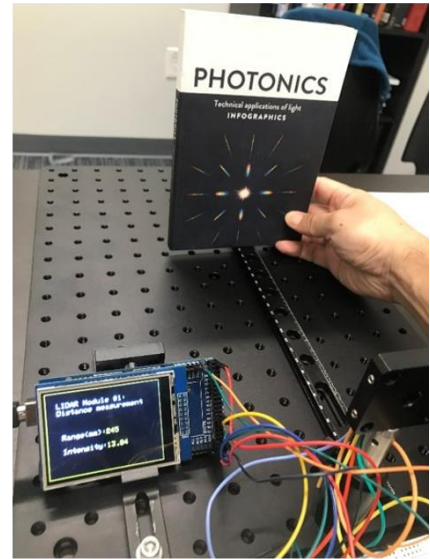
# Photonics + Optics + Programming



```

C #include <Elegoo_TFTLCD.h> Untitled-1
40 TouchScreen ts = TouchScreen(A0, A1, A2, A3, A4, A5, A6);
41 boolean buttonEnabled = true;
42 VLS3L1X sensor;
43
44 void setup() {
45   Serial.begin(9600);
46   Serial.println("Module #2 is ready");
47   pinMode(led_red, OUTPUT);
48   pinMode(led_white, OUTPUT);
49
50   Wire.begin();
51   Wire.setClock(400000); // use 400 kHz I2C
52
53   sensor.setTimeout(500);
54   if (!sensor.init())
55   {
56     Serial.println("Failed to detect and initialize sensor!");
57     while (1);
58   }
59   // Use long distance mode and allow up to 50000 us (50 ms) for
60   // You can change these settings to adjust the performance of
61   // the minimum timing budget is 20 ms for short distance mode
62   // medium and long distance modes. See the VLS3L1X datasheet f
63   // Information on range and timing timing

```



## Relationship of Course to ABET Criteria

ABET Criteria (Adopted 2019)	Level of Emphasis During Course (Low, Medium, High)
1. Graduates have an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	High
2. Graduates have an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	High
3. Graduates have an ability to communicate effectively with a range of audiences.	Medium
4. Graduates have an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	High
5. Graduates have an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.	High
6. Graduates have an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	High
7. Graduates have an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	High

**Textbook: None**

## Recommended Reference:

Arduino Tutorials: <https://www.arduino.cc/en/Tutorial/HomePage>

**Other Reference Books: None**

## Course Grading

Criteria	Grade Weighting
Attendance	50%
Quizzes	20%
Final Project	30%
Total	100%

**Final Project:** Students will choose one from selected topics where they design their modules and demonstrate them.

**Financial Aid and Attendance:** All faculty members are required to document students' academic activity at the beginning of each course. This will be documented by taking attendance. If you miss the first class, please come to the instructor to make other arrangements. Failure to do so will result in a delay in the disbursement of your financial aid.

Grading Scale (%)	Rubric Description
100 ≥ A > 90	Excellent, has a strong understanding of all concepts and is able to apply the concepts in all and novel situations. Has full mastery of the content of the course.
90 ≥ B > 80	Good, has a strong understanding of most or all of the concepts and is able to apply them to stated and defined situations.
80 ≥ C > 70	Average, has a basic understanding of the major concepts of the course and is able to apply to basic situations.
70 ≥ D > 60	Below average, has a basic understanding of only the simple concepts and is able to apply to only a limited number of the most basic situations.
60 ≥ F ≥ 0	Demonstrates no understanding of the course content. Absent the class three times.

### Grade Objections:

All objections to grades should be made **in writing within one week** of the work in question. Objections made after this period has elapsed will **not** be considered.

### Class Website:

Materials used for classes will be available on UCF Webcourses for download before each class.

### Dates:

First Day of Class	1/9
Last Day to Add/Drop Classes:	1/12 (Friday)
Withdrawal Deadline	3/22 (Friday)
Final project demonstration	4/9 & 4/16

Week	Date	Concepts Presented:
1	1/9	<b>Introduction and Module1</b> Basics of Arduino Basics of Programming: Sketch LED control & dimming
2	1/16	<b>Module1: Hello LED</b> LED digital dimming LED switch (pushbutton)
3	1/23	<b>Module1: Hello LED</b> LED switch (counting) LED wand <b>Module2: Smart Home</b> Photoresistor
4	1/30	<b>Module2: Smart Home</b> Photodiode Integration of LED and light sensing Seven segment display
5	2/6	<b>Module2: Smart Home</b> Libraries Auto-dimming People counter
6	2/13	<b>Module3: Touch screen display</b> Basic functions Controlling LED with touch screen
7	2/20	<b>Module3: Touch screen display</b> LED dimming with touch screen Light sensing and display with touch screen Graphing & statistics
8	2/27	<b>Module4: Smart Auto</b> LIDAR Measuring distance with light
9	3/5	<b>Module4: Smart Auto</b> Proximity sensor and warning Exporting data using MATLAB (serial communication)
10	3/12	<b>Module4: Smart Auto</b> 1D LIDAR imaging Servo
11	3/19	<b>Spring Break (NO CLASS)</b>
12	3/26	<b>Module5: Imaging</b> Camera (ArduCam) Image processing
13	4/2	<b>Module5: Imaging</b> Optical microscope Measuring feature size Imaging & LIDAR
14	4/9	<b>Final Project:</b> Showcase Group 1
15	4/16	<b>Final Project:</b> Showcase Group 2

## **Academic Integrity**

Students should familiarize themselves with UCF's Rules of Conduct at <http://osc.sdes.ucf.edu/process/roc> According to Section 1, "Academic Misconduct," students are prohibited from engaging in

1. Unauthorized assistance: Using or attempting to use unauthorized materials, information or study aids in any academic exercise unless specifically authorized by the instructor of record. The unauthorized possession of examination or course-related material also constitutes cheating.
2. Communication to another through written, visual, electronic, or oral means: The presentation of material which has not been studied or learned, but rather was obtained through someone else's efforts and used as part of an examination, course assignment, or project.
3. Commercial Use of Academic Material: Selling of course material to another person, student, and/or uploading course material to a third-party vendor without authorization or without the express written permission of the university and the instructor. Course materials include but are not limited to class notes, Instructor's PowerPoints, course syllabi, tests, quizzes, labs, instruction sheets, homework, study guides, handouts, etc.
4. Falsifying or misrepresenting the student's own academic work.
5. Plagiarism: Using or appropriating another's work without any indication of the source, thereby attempting to convey the impression that such work is the student's own.
6. Multiple Submissions: Submitting the same academic work for credit more than once without the express written permission of the instructor.
7. Helping another violate academic behavior standards.

For more information about Academic Integrity, consult the International Center for Academic Integrity <http://academicintegrity.org>.

For more information about plagiarism and misuse of sources, see "Defining and Avoiding Plagiarism: The WPA Statement on Best Practices" <http://wpacouncil.org/node/9> .

## **Responses to Academic Dishonesty, Plagiarism, or Cheating**

Students should also familiarize themselves with the procedures for academic misconduct in UCF's student handbook, The Golden Rule <<http://goldenrule.sdes.ucf.edu/docs/goldenrule.pdf>>. UCF faculty members have a responsibility for students' education and the value of a UCF degree, and so seek to prevent unethical behavior and when necessary respond to academic misconduct. Penalties can include a failing grade in an assignment or in the course, suspension or expulsion from the university, and/or a "Z Designation" on a student's official transcript indicating academic dishonesty, where the final grade for this course will be preceded by the letter Z. For more information about the Z Designation, see <http://goldenrule.sdes.ucf.edu/zgrade>

## **Students with Special Testing/Learning Needs:**

The University of Central Florida is committed to providing access and inclusion for all persons with disabilities. Students with disabilities who need access to course content due to course design limitations should contact the professor as soon as possible. Students should also connect with Student Accessibility Services (SAS) <http://sas.sdes.ucf.edu/> (Ferrell Commons 185, sas@ucf.edu, phone 407-823-2371). For students connected with SAS, a Course Accessibility Letter may be created and sent to professors, which informs faculty of potential course access and accommodations that might be necessary and reasonable. Determining reasonable access and accommodations requires consideration of the course design, course learning objectives and the individual academic and course barriers experienced by the student. Further conversation with SAS, faculty and the student may be warranted to ensure an accessible course experience.

## **Religious Observances**

Students must notify their instructor in advance if they intend to miss class for a religious observance. For more information, see the UCF policy at

<http://regulations.ucf.edu/chapter5/documents/5.020ReligiousObservancesFINALJan19.pdf>

### **Deployed Active Duty Military Students**

Students who are deployed active duty military and/or National Guard personnel and require accommodation should contact their instructors as soon as possible after the semester begins and/or after they receive notification of deployment to make related arrangements.

### **Campus Safety Statement**

Emergencies on campus are rare, but if one should arise during class, everyone needs to work together. Students should be aware of their surroundings and familiar with some basic safety and security concepts.

- In case of an emergency, dial 911 for assistance.
- Every UCF classroom contains an emergency procedure guide posted on a wall near the door. Students should make a note of the guide's physical location and review the online version at [http://emergency.ucf.edu/emergency\\_guide.html](http://emergency.ucf.edu/emergency_guide.html).
- Students should know the evacuation routes from each of their classrooms and have a plan for finding safety in case of an emergency.
- If there is a medical emergency during class, students may need to access a first-aid kit or AED (Automated External Defibrillator). To learn where those are located, see <http://www.ehs.ucf.edu/AEDlocations-UCF> (click on link from menu on left).
- To stay informed about emergency situations, students can sign up to receive UCF text alerts by going to <https://my.ucf.edu> and logging in. Click on "Student Self Service" located on the left side of the screen in the toolbar, scroll down to the blue "Personal Information" heading on the Student Center screen, click on "UCF Alert", fill out the information, including e-mail address, cell phone number, and cell phone provider, click "Apply" to save the changes, and then click "OK."
- Students with special needs related to emergency situations should speak with their instructors outside of class.
- To learn about how to manage an active-shooter situation on campus or elsewhere, consider viewing this video (<https://youtu.be/NIKYajEx4pk>).